

## Development of a User Interface for the PVT SelfTest (PST)

Completed Technology Project (2007 - 2008)



## Project Introduction

The overarching goal of the project is to provide a brief, validated, zero upmass, performance test to provide astronauts with immediate feedback about cognitive deficits caused by a variety of factors in space flight (e.g., sleep loss, sleep shifts, medication use). Substantial progress has been made on developing astronaut norms based on N=241 PVT SelfTest trials acquired on 11 astronauts (aquanuts) and other crew acquired in NEEMO 9, NEEMO 12, and NEEMO 13. Significant advances were made in the development of an algorithm that calculates a numerical performance index to provide astronauts with feedback about their PVT SelfTest performance that is both informative about the test performance and about the validity of the test. Prototype data interpretation displays were generated that varied both the type of performance information displayed and the method of display (e.g., numerical, graphical). The performance feedback algorithm and display were programmed into the current Windows PVT SelfTest architecture by Pulsar Informatics Inc. A demonstration version of full PVT SelfTest including performance feedback algorithm and display was generated for evaluation by NEEMO astronauts for refinement and preparation for validation on ISS.

## Anticipated Benefits

The primary aim of this project was to develop a brief, validated, performance feedback interface to provide astronauts with immediate feedback about cognitive deficits caused by sleep loss, sleep shifts, medication use, and other factors that may degrade performance. These factors are present during Earth-based operations by astronauts. The PVT SelfTest may provide astronauts with a useful performance monitoring tool to aid in the selection of fatigue countermeasures during training and mission preparation; especially when operations include sleep loss, night work, and travel to Russia. Additionally, the PVT SelfTest can be adapted to provide mission control personnel with a tool to provide individualized performance capability feedback during continuous mission support operations by establishing appropriate normative data representative of mission controllers.



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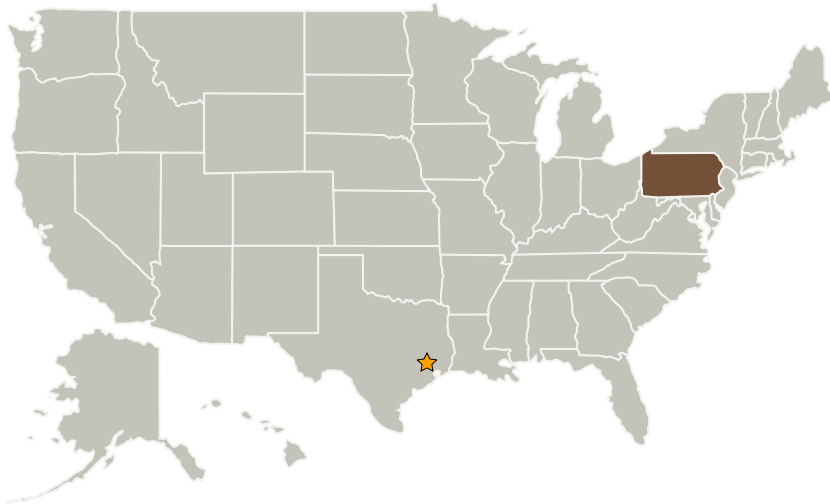
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
University of Pennsylvania	Supporting Organization	Academia	Philadelphia, Pennsylvania

## Primary U.S. Work Locations

Pennsylvania

## Project Transitions

**September 2007:** Project Start

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Operations Mission Directorate (SOMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Human Spaceflight Capabilities

## Project Management

**Program Director:**

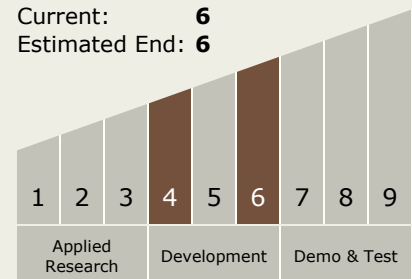
David K Baumann

**Principal Investigator:**

David F Dinges

## Technology Maturity (TRL)

Start: 4  
Current: 6  
Estimated End: 6



## Technology Areas

**Primary:***Continued on following page.*

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### ✓ August 2008: Closed out

**Closeout Summary:** The overarching goal of the project is to provide a brief, validated, zero upmass, performance test to provide astronauts with immediate feedback about cognitive deficits caused by a variety of factors in space flight (e.g., sleep loss, sleep shifts, medication use). Substantial progress has been made on developing astronaut norms based on N=241 PVT SelfTest trials acquired on 11 astronauts (aquonauts) and other crew acquired in NEEMO 9, NEEMO 12, and NEEMO 13. Significant advances were made in the development of an algorithm that calculates a numerical performance index to provide astronauts with feedback about their PVT SelfTest performance that is both informative about the test performance and about the validity of the test. Prototype data interpretation displays were generated that varied both the type of performance information displayed and the method of display (e.g., numerical, graphical). The performance feedback algorithm and display were programmed into the current Windows PVT SelfTest architecture by Pulsar Informatics Inc. A demonstration version of full PVT SelfTest including performance feedback algorithm and display was generated for evaluation by NEEMO astronauts for refinement and preparation for validation on ISS.

### Project Website:

<https://taskbook.nasaprs.com>

### Technology Areas (cont.)

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.3 Human Health and Performance
    - └ TX06.3.3 Behavioral Health and Performance

### Target Destinations The Moon, Mars